WHAT IS CLAIMED IS:

1. A plasma chamber enclosure structure for use in an RF plasma reactor which includes a pedestal adapted to support a workpiece to be processed, a reactor base housing the pedestal, and a coil antenna adjacent the reactor and which is adapted to inductively couple RF power into the reactor, said plasma chamber enclosure structure comprising:

a) said plasma chamber enclosure structure being a single-wall dielectric enclosure structure;

b) said plasma chamber enclosure structure being of an inverted cup-shape configuration;

c) said plasma chamber enclosure comprising a ceiling comprising:

(i) a centrally located gas inlet; and

(ii) an interior surface comprising a flattened conical configuration extending to said gas inlet such that when positioned over the base said interior surface is more distant from the pedestal over a center of the pedestal and closer to the pedestal over a periphery of the pedestal;

d) said plasma chamber enclosure structure having a sidewall, said sidewall comprising:

(i) a lower cylindrical portion generally transverse to the pedestal when positioned over the base; and

(ii) a transitional portion between said lower cylindrical portion and said ceiling, said transitional portion extending inwardly from said lower cylindrical portion, said transitional portion comprising a radius of curvature;

e) said plasma chamber enclosure structure being adapted to cover the reactor base to comprise the RF plasma reactor;

f) said plasma chamber enclosure structure being adapted to define a plasma-processing volume over the pedestal;

g) said plasma chamber enclosure structure being capable of transmitting inductive power therethrough from an adjacent antenna;

h) said plasma chamber enclosure structure being formed of a dielectric material selected from a group consisting of silicon, silicon carbide, quartz, and alumina; and

i) said interior surface of said ceiling of said flattened conical configuration being a substantial portion of said interior surface of said ceiling.

2. The enclosure structure of Claim 1 being adapted to be positioned adjacent the antenna.

3. The enclosure structure of Claim 2 wherein said dielectric material consists of alumina.

4. The enclosure structure of Claim 1 wherein said dielectric material consists of alumina.

5. The enclosure structure of Claim 1 being integrally formed of one of a) alumina, or b) silicon.

6. The enclosure structure of Claim 1 wherein said top wall and said side wall consist of silicon.

7. The enclosure structure of Claim 1 further comprising a conductive ceiling portion in a facing relationship to the pedestal when positioned over the base.

8. The enclosure structure of Claim 7 wherein said

conductive ceiling portion is adapted to be coupled to a bias power source.

9. The enclosure structure of Claim 1 wherein said ceiling comprises conductive material and is adapted to be coupled to a bias power source.

10. The enclosure structure of Claim 1 having a generally right circular cylindrical configuration.

11. A plasma chamber dome for an RF plasma reactor which includes a pedestal adapted to support a workpiece to be processed, a reactor base housing the pedestal, and a coil antenna adjacent the reactor and which is adapted to inductively couple RF power into the reactor, said dome comprising:

a) said dome having an inverted cup-shape configuration having top and side walls in a generally right circular cylindrical configuration;

b) said top wall comprising:

(i) a centrally located gas inlet; and

(ii) a substantially flat interior surface extending to said gas inlet, said substantially flat interior surface of said top wall having at least a portion extending in a direction away from said centrally located gas inlet with an angle of declination toward the pedestal;

c) said sidewall comprising:

(i) a lower cylindrical portion generally transverse to the pedestal when positioned over the base; and

(ii) a transitional portion between said lower cylindrical portion and said top wall, said transitional portion extend inwardly from said lower cylindrical portion, said transitional portion comprising at least one radius of

curvature;

d) said dome being adapted so as to be capable of having said top wall in a facing relationship to the pedestal when positioned over the base;

e) said dome being adapted to define a plasma-processing volume over the pedestal;

f) said dome being adapted to cover the reactor base to comprise the RF plasma reactor;

g) said dome being capable of transmitting inductive power therethrough from an adjacent antenna;

h) said top wall and said side wall being formed of a dielectric material selected from a group consisting of silicon, silicon carbide, quartz, alumina, and sapphire; and

i) said substantially flat interior surface being a substantial portion of said interior surface of said top wall.

12. The plasma chamber dome of Claim 11 wherein said top wall and said side wall consist of silicon.

13. The plasma chamber dome of Claim 11 wherein said top wall and said side wall consist of alumina.

14. The plasma chamber dome of Claim 11 being integrally formed of one of a) alumina, or b) silicon.

15. The plasma chamber dome of Claim 11 further comprising a flange portion extending radially outward from said side wall.

16. The plasma chamber dome of Claim 15 wherein said top wall and said side wall consist of silicon.

17. The plasma chamber dome of Claim 15 wherein said top wall and said side wall consist of alumina.

18. The plasma chamber dome of Claim 15 wherein said top wall and said side wall consist of alumina.

19. The plasma chamber dome of Claim 11 comprising a conductive ceiling portion in a facing relationship to the pedestal when positioned over the base.

20. The plasma chamber dome of Claim 19 wherein said conductive ceiling portion is adapted to be coupled to a bias power source.

21. The plasma chamber dome of Claim 11 wherein said top wall comprises conductive material, said top wall being adapted to be coupled to a bias power source.

22. An RF plasma reactor which includes a pedestal adapted to support a workpiece to be processed, a reactor base housing the pedestal, and a coil antenna adjacent the reactor and which is adapted to inductively couple RF power into the reactor, the reactor comprising:

a) a single-wall dielectric enclosure structure of an inverted cup-shaped configuration having a ceiling comprising a centrally located gas inlet and comprising an interior surface comprising a conical profile extending to said gas inlet;

b) said single-wall dielectric enclosure structure having a side wall comprising a cylindrical portion generally transverse to the pedestal when positioned over the base and comprising a transition portion extending inward from said cylindrical portion, said transition

portion comprising at least one radius of curvature;

c) said single-wall dielectric enclosure structure being adapted to cover the reactor base to comprise the RF plasma reactor;

d) said single-wall dielectric enclosure structure being adapted to define a plasma-processing volume over the pedestal;

e) said single-wall dielectric enclosure structure being capable of transmitting inductive power therethrough from an adjacent antenna;

f) said single-wall dielectric enclosure structure being formed of a dielectric material selected from a group consisting of silicon, silicon carbide, quartz, and alumina; and

g) said ceiling of said conical profile being a substantial portion of said ceiling.

23. The reactor of Claim 22 wherein said ceiling when position over the base is in spaced facing relationship to the pedestal.

24. The reactor of Claim 23 wherein said enclosure structure consists of alumina.

25. The reactor of Claim 23 wherein said side wall is adapted to be positioned adjacent the antenna.

26. The reactor of Claim 22 wherein said enclosure structure has a generally right circular cylindrical configuration.

27. The reactor of Claim 22 wherein said dielectric consists of alumina.

28. The reactor of Claim 22 wherein said single-walled dielectric enclosure structure is integrally formed of one of a) alumina, or b) silicon.

29. The reactor of Claim 22 comprising a conductive ceiling portion in a facing relationship to the pedestal when positioned over the base.

30. The reactor of Claim 29 wherein said conductive ceiling portion is adapted to be coupled to a bias power source.

31. The reactor of Claim 22 wherein said ceiling comprises a conductive material and is adapted to be coupled to a bias power source.